Optimal Price calculation

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Import libraries

```
library(ISLR)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

```
library(ggplot2)
```

Data

Load the dataset “safeBabies” which contains 3 columns for 400 stores from Carseats

```
SafeBabies <- Carseats %>% select("Sales", "Price", "ShelveLoc")
```

Filter the data into three levels Bad, Good and medium based on the factor “ShelveLoc”

```
Bad <- filter(SafeBabies,ShelveLoc == 'Bad')
Good <- filter(SafeBabies,ShelveLoc == 'Good')
Medium <- filter(SafeBabies,ShelveLoc == 'Medium')
```

Build a regression model for sales w.r.t price where the level of shelve location is Good

```
Good1<-Good[order(Good$Price),]
head(Good1)
```

```
##    Sales Price ShelveLoc
## 80 14.37    53      Good
## 52 12.98    63      Good
## 8  13.91    68      Good
## 64 15.63    72      Good
## 56 11.82    74      Good
## 37 11.48    77      Good
```

```
GoodModel <- lm(Good1$Sales ~ Good1$Price, data = Good1)
summary(GoodModel)
```

```
##
## Call:
## lm(formula = Good1$Sales ~ Good1$Price, data = Good1)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -3.721 -1.351 -0.098  1.483  4.353
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 17.968864   0.988008  18.187  < 2e-16 ***
## Good1$Price -0.065785   0.008199  -8.023 5.85e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.888 on 83 degrees of freedom
## Multiple R-squared:  0.4368, Adjusted R-squared:   0.43
## F-statistic: 64.37 on 1 and 83 DF,  p-value: 5.848e-12
```

Optimal price for selling the car seats at those stores where the shelve location is good

```r
good_optimal_price = (-0.065785 *55 - 17.968864)/(2 * -0.065785)
good_optimal_price
```

```
## [1] 164.0727
```

Good optimal price for change in production cost from 40$ to 85$

```r
result <- vector("numeric", 40)
for(cost in 40:86) {
     good_optimal_results <- (-0.065785 *cost - 17.968864)/(2 * -0.065785)
   result[cost - 40] <- good_optimal_results
}
head(result)
```

```
## [1] 157.0727 157.5727 158.0727 158.5727 159.0727 159.5727
```

```
price<- c(40:85)
optimized_price_good<-cbind.data.frame(result,price)
names(optimized_price_good)<-c('Optimal Price','Change in Cost')
```

Build a regression model for sales w.r.t price where the level of shelve location is Bad

```
Bad1<-Bad[order(Bad$Price),]
head(Bad1)
```

```
##    Sales Price ShelveLoc
## 51  7.78    64       Bad
## 40  9.32    70       Bad
## 3  10.81    72       Bad
## 71  6.88    72       Bad
## 92  8.14    78       Bad
## 23  8.01    79       Bad
```

```
BadModel <- lm(Bad1$Sales ~ Bad1$Price, data = Bad1)
summary(BadModel)
```

```
## 
## Call:
## lm(formula = Bad1$Sales ~ Bad1$Price, data = Bad1)
## 
## Residuals:
##     Min      1Q  Median      3Q     Max 
## -4.4622 -1.0617 -0.2014  1.2050  4.6412 
## 
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)    
## (Intercept) 11.832984   0.990317  11.949  < 2e-16 ***
## Bad1$Price  -0.055220   0.008486  -6.507  3.7e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 1.967 on 94 degrees of freedom
## Multiple R-squared:  0.3105, Adjusted R-squared:  0.3032 
## F-statistic: 42.34 on 1 and 94 DF,  p-value: 3.702e-09
```

Optimal price for selling the car seats at those stores where the shelve location is bad

```
Bad_Optimal_price = (-0.05522 * 55 - 11.832984) / (2 * -0.05522)
Bad_Optimal_price
```

```
## [1] 134.644
```

Bad optimal price for change in production cost from 40$ to 85$

```
result <- vector("numeric", 40)
for(cost in 40:86) {
     bad_optimal_results <- (-0.05522 *cost - 11.832984)/(2 * -0.05522)
   result[cost - 40] <- bad_optimal_results
}
head(result)
```

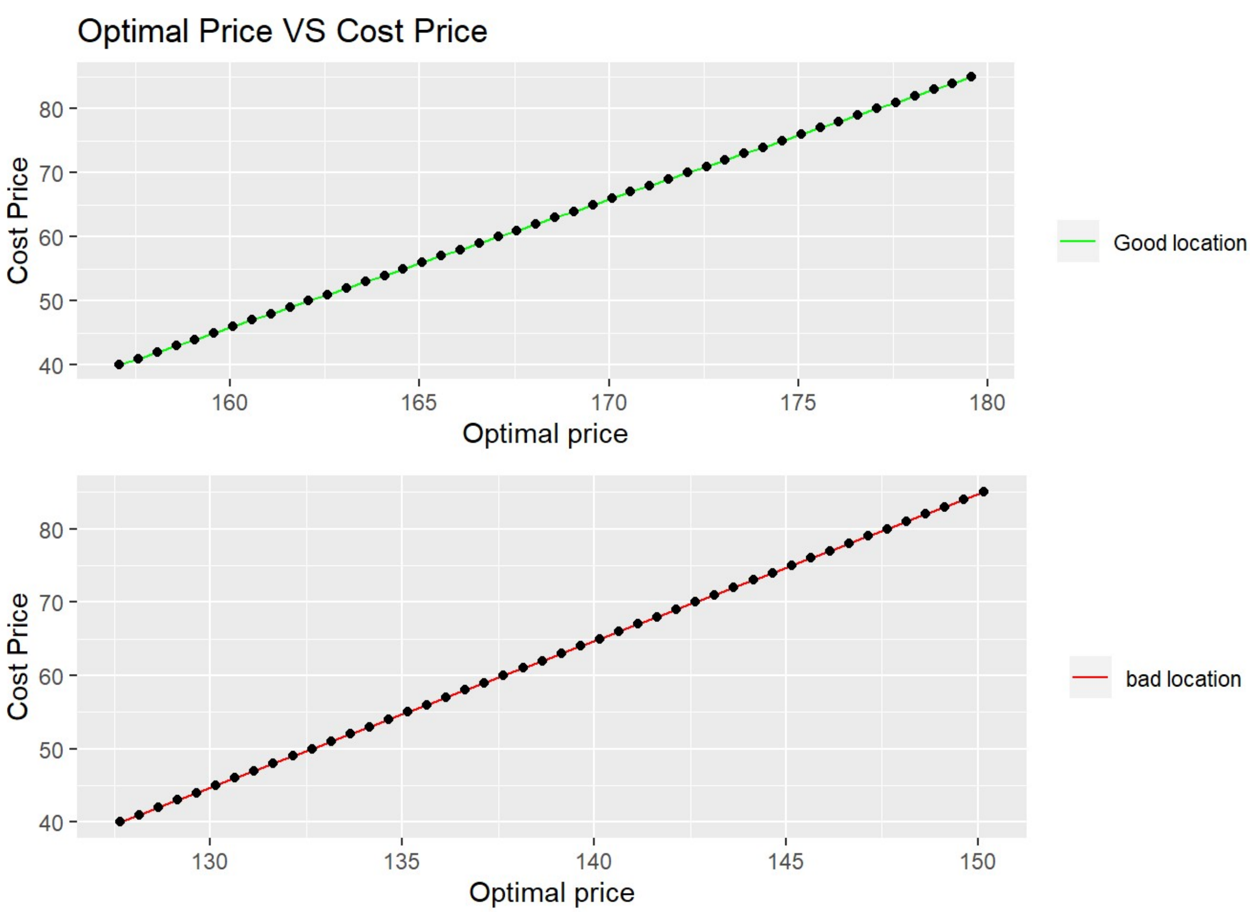
```
## [1] 127.644 128.144 128.644 129.144 129.644 130.144
```

```
price<- c(40:85)
optimized_price_bad<-cbind.data.frame(result,price)
names(optimized_price_bad)<-c('Optimal Price','Change in Cost')
```

Plot the optimal price for selling the car seats at those stores where the shelve location is good and those where the shelve location is bad when varying the production costs from $40 to $85.

```
Plot1<-ggplot(optimized_price_good, aes(optimized_price_good$`Optimal Price`, optimize
d_price_good$`Change in Cost`, colour='Good location')  ) + labs(title = 'Optimal Pric
e VS Cost Price',x='Optimal price',y='Cost Price') + geom_line() +  scale_color_manual
("", values = ("Good Price'" = "green")) +geom_point(colour='black')

Plot2<-ggplot(optimized_price_bad, aes(optimized_price_bad$`Optimal Price`, optimized_
price_bad$`Change in Cost`, colour='bad location ')  ) + labs(x='Optimal price',y='Cos
t Price') + geom_line() +  scale_color_manual("", values = ("bad Price'" = "red")) +ge
om_point(colour='black')
grid.arrange(Plot1, Plot2, ncol=1)
```



Based on the above graph optimal price changes with respect to cost price by considering the factor of shelve location

When cost price is 55 and shelve location is good the optimal price is 164.07

When cost price is 55 and shelve location is bad the optimal price is 134.64